

*DENDROGASTER ARGENTINENSIS*, NEW SPECIES, A  
SOUTH AMERICAN SEA-STAR PARASITE  
(CRUSTACEA: ASCOTHORACIDA)

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*Abstract.*—*Dendrogaster argentinensis* is a coelomic parasite of the subantarctic sea-star *Anasterias minuta* Perrier at Puerto Deseado, Argentina. Mature and juvenile females, and males, are described. This species resembles *D. fisheri* Grygier and *D. arctica* Korschelt from the northern Pacific Ocean, but is distinguished by the extreme reduction of the antennular claw guard in females. Presence of the parasite sometimes is obviously detrimental to the host. *Dendrogaster argentinensis* is the first ascothoracid described from the South American coast.

*Resumen.*—*Dendrogaster argentinensis* es un parásito de la cavidad celómica de la estrella de mar subantártica *Anasterias minuta* Perrier en Puerto Deseado, Argentina. Se describen hembras juveniles y maduras, y también machos. Esta especie es semejante a *D. fisheri* Grygier y a *D. arctica* Korschelt, ambas del Pacífico Norte, pero se distingue de ellas por la extrema reducción del proceso guardián de la uña antenular en las hembras. La presencia del parásito es a veces obviamente perjudicial para el huésped. *Dendrogaster argentinensis* es el primar ascotorácido citado para las costas de América del Sur.

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The Ascothoracida are crustacean parasites of echinoderms and coelenterates, the most recent review being Wagin's (1976) monograph. The genus *Dendrogaster* Knipowitsch, the most specialized in the subclass, are endoparasites of sea-stars (Asteroidea). They have replaced most of the structure and function of their segmented body with a greatly enlarged and elaborated, branched carapace or mantle (Wagin 1954). About 20 species of *Dendrogaster* were described or reviewed by Wagin (1950, 1976), and Grygier (1981, 1982) added three more species.

Few ascothoracids are known from the South Atlantic. *Waginella sandersi* (Newman) was collected on the bottom (5200 m) at 43°33.0'S, 48°58.1'W (Newman 1974, Grygier 1983a). *Ascothorax bulbosus* Heegaard, which infests two species of the ophiuroid *Amphiura* at 110-175 m near South Georgia (Heegaard 1951), actually represents two species (Grygier 1983b). *Ascothorax gigas* Wagin parasitizes *Ophionotus victoriae* Bell along the Antarctic Peninsula and in the South Sandwich Islands (Wagin 1968, Grygier and Fratt 1984). An undescribed species of *Ascothorax* lives in *Ophiurolepis inornata* (Lyman) at 800 m off the Patagonian shelf (Bartsch 1982, Grygier 1983b). *Dendrogaster* has been recorded twice in the South Atlantic. Le Roi (1905, 1907) described *D. arborescens* from *Dipsacaster sladeni* Alcock off Cape Town, and Fisher (1940) noted *Diplasterias meridionalis* (Perrier) from 27 m at South Georgia infested with as yet unstudied *Dendrogaster* specimens.

This report is the description of the first ascothoracid from the shores of the South American continent, a new species of *Dendrogaster* parasitic in the asteroid *Anasterias minuta* Perrier. This is a middle-sized, brooding, asteriid sea-star that inhabits rocky shores (0-80 m) in subantarctic waters: southern Argentina in Santa

Cruz province and Tierra del Fuego, southern Chile, and the Falkland Islands (Islas Malvinas) (Bernasconi 1964). The *Dendrogaster* specimens were discovered by one of us (Salvat, thesis in prep.) during a study of seasonal changes in the gonads of a population of *A. minuta* at Puerto Deseado, Santa Cruz province.

*Dendrogaster argentinensis*, new species

Figs. 1-12

*Diagnosis.*—Females: Middle piece and main branches short; 4 approximately equal primary branches usually with short, alternate, lobular side branches. Antennular claw guard vestigial, its 3 setae arising directly from article; usually 1 seta proximal to these; no fusion seam on third article. Males: Strap-like testes in long, tubular, posterior protrusions. Anterodorsal spines on third antennular article with comb-rows of teeth; no fusion seam. Short aesthetasc on fourth article; 1 seta at base of claw. Furcal rami with 4 mediobasal setae.

*Etymology.*—Named for country of origin.

*Methods and materials.*—Three hundred and twenty-six specimens of *A. minuta*, collected by I. Zizich in 1973 and by H. Bello and I. Zizich in 1979 at Puerto Deseado, Argentina (47°45'S, 65°55'W), were examined for *Dendrogaster* parasites. Five infested sea-stars were found (infestation rate 1.5%). Parts of some specimens were embedded in paraffin for histological examination, the results of which are not discussed here. Antennules and mouthparts of 2 females were mounted in glycerine jelly, and a male was examined whole in lactic acid.

Holotype and 2 paratypes deposited in Museo Argentino de Ciencias Naturales, Buenos Aires (Cat. nos. 31708-10), other paratype (4, below) in National Museum of Natural History, Washington, D.C. (USNM 195246).

1) *Holotype*, mature ♀ brooding eggs, with 2 ♂♂ (♀ and ♂♂ ready to molt), coll. 6 Jun 1973; 3 complete primary branches and middle piece in ethanol, fourth primary branch in paraffin with some sections, appendages mounted. It filled an arm of host sea-star, pyloric caeca in that arm almost totally atrophied. 2) *Paratype*, mature ♀ brooding eggs, with ♂, coll. 15 Oct 1973; part in ethanol broken into many pieces, including 2 reasonably complete primary branches and a ♂ posterior protrusion; part in paraffin with some sections. Host was ♂, no data on its condition. 3) Not a type, mature ♀ with ♂, coll. 7 May 1973; parts of ♀ and ♂ in paraffin with some sections, rest of animal lost. It occupied ♀ host's disc. 4) *Paratype*, juvenile ♀, coll. 23 May 1979; complete in ethanol except for mounted appendages. It was tangled in proximal part of pyloric caeca of one arm of ♂ host. 5) *Paratype*, juvenile ♀, coll. 19 Dec 1979; complete in ethanol. Host was ♀, no data on its condition.

*Description.*—Females. Carapace or mantle consists of short middle piece little longer than wide, short, lateral main branches at base of middle piece, 2 more or less laterally directed primary branches on each side. In juveniles (Figs. 1, 2), middle pieces 1.8 mm and 0.6 mm long, carapace breadth 13.2 mm and 6.0 mm, respectively. Anterior primary branches little longer than posterior ones, 2 rows of bumps on each branch.

Mature females too broken up to measure carapace breadth, but primary branches (Figs. 3, 4) 17.0-22.4 mm long, 2.5-3× longer than larger juvenile. Axis of each branch narrows distally, giving off alternate side branches (in one exceptional case branches occur oppositely (Fig. 3)). Carapace viscera (gut and ovary diverticula), which follow mantle branching, also branch alternately (Fig. 4). Side



Figs. 1-12. *Dendrogaster argentinensis*: 1-7 ♀♀, 8-12 ♂. 1, Juvenile (MACN 31710); 2, Juvenile (USNM 195246); 3, Holotype fragment (MACN 31708), middle piece and one primary branch with unusual opposite side branching; 4, MACN 31709, primary branch with typical alternate branching; 5, Antennule of 2; 6, Antennule of 3; 7, Tip of maxilla of 2; 8, ♂ from mantle cavity of holotype; 9, Main body of 8, cutaway view; 10, Antennule, lateral view; 11, Thoracopod (T2), lateral view; 12, Furcal ramus, lateral view, only bases of some medial setae shown. Abbreviations: a, aesthetasc; b, main branch; g, midgut diverticulum (dashed); m, adductor muscle; mp, middle piece; n, thoracic ganglion; o, oral cone; p, primary branch; s, stomach; x, maxillary gland. Scale bars in mm.

branches irregular or, more usually, 3-lobed, with comparatively narrow pedicel; proximal ones little larger and more elaborate than distal ones.

Antennules of larger juvenile 0.32 mm long, 4-segmented (Fig. 5). First and second articles broader than long, second one smaller. Third article little narrower than these, longer than wide with oblique distal edge; 2 small, anterodistal spines but no appreciable anterobasal fusion seam (Wagin 1950). Fourth article rhomboidal with distal claw that forms subchela with third article, claw positioned opposite 2 spines. Small seta at anterior base of claw, spine to one side in at least 1 antennule; posterior edge with 1 or 2 small sensilla, posterodistal angle with 3 setae (no claw guard).

In holotype, antennules about 0.41 mm long, 50% wider than in juvenile (Fig. 6). First article comparatively shorter and wider than before, with curved basal edge. Second and third articles unchanged in proportion, spines on latter more setiform than before, with row of setules in 1 antennule. Large apodeme at anterior junction of third and fourth articles. Fourth article has tiny posterior sensillum, seta at anterior base of claw, and 3 posterodistal setae.

In both females, oral cone triangular in cross section; labrum pointed, its rear margins not meeting. Only mouthparts are maxillae (Fig. 7), fused medially for most of length, bifid tips with lightly curved posterior points.

Both mature type-females were brooding subspherical to oval eggs averaging  $465 \times 390 \mu\text{m}$  in holotype,  $414 \times 353 \mu\text{m}$  in paratype (20 from each measured).

Males. Typical for *Dendrogaster*, dwarfs living in female mantle cavity. Bivalved carapace gives rise to pair of long, tubular, posterior processes containing branch of gut and strap-like testes (Fig. 8). Protrusions up to about 16.5 mm long, 0.65 mm wide, cuticle weakly annulated. Main body (Fig. 9) with pair of antennules, oral cone, 6 thoracomeres (last 5 bearing limbs), and 5-segmented abdomen with furca. Limbs and furca bear natatory setae. Anteroventral part of thorax grossly swollen below internal organs to link hypertrophied valves.

Antennules about 0.23 mm long (Fig. 10). First 2 articles short and broad, third article as large as them together. Anterodistal spines on third article very short, with distal-facing row of comb-like teeth; no fusion seam. Fourth article more elliptical than in females; claw sickle-shaped, with short seta at base; distal edge with, progressively closer to claw, a short, strap-like aesthetasc, long seta, and short process (claw guard) with terminal seta and 2 basal setae. Oral cone shorter than antennules, constructed as in females.

Limbs only on thoracomeres 2-6, called T2-6 accordingly (Fig. 11). Each with elongate coxa, shorter oblong basis, biarticulate exopod, triarticulate endopod (biarticulate in T6). T2 and T3 with laterodistal coxal seta, T5 lacking it, T4 impossible to see clearly. Exopod with 4 terminal setae, possibly 3 in T6, endopod with 2. Medial setae, if any, not visible in whole mount. T6 shorter than T2-5.

Thoracomeres progressively less high posteriorly (Fig. 9). In abdomen, fifth segment (telson) longest, third and fourth segments shortest. Furcal rami (Fig. 12) almost square, with 4 long, mediobasal setae, 1 mediodorsal seta, 4 distal setae, second from top as long as medial setae, other 3 less than half as long.

#### Discussion

*Affinities.*—*Dendrogaster argentinensis* differs from all known species of the genus in having a vestigial antennular claw guard in the female, its three setae

arising directly from the body of the fourth article. Otherwise, it closely resembles *D. fisheri* Grygier, 1982, which parasitizes *Pedicellaster magister megalabis* Fisher in deep California waters. Both species have a short middle piece and main branches, and two pairs of primary branches with short, alternating side branches that may have a few terminal lobes. However, *D. fisheri* is smaller at maturity (largest specimen only 26 mm across), and the axes of its primary branches are broad, distended by eggs; the branch axes do not get swollen in *D. argentinensis*. *Dendrogaster fisheri* has a claw guard, and there are two setae posterior to it, not just one. It has a lateral seta at the base of the claw and an isolated distal seta on the third article, both lacking in *D. argentinensis*. Lastly, the third article is wider than long and has a distinct fusion seam in *D. fisheri*. These antennular distinctions must be viewed with caution, because antennular armament can be ontogenetically variable in *Dendrogaster* (Karande and Oguro 1981).

*Dendrogaster argentinensis* also resembles *D. arctica* Korschelt, which lives in *Leptasterias groenlandica* (Lütken) in the Bering Sea, and whose juveniles have four simple primary branches with lobular side branches (Fisher 1930, Wagin 1950). The side branches, however, are not subdivided. The antennular armament illustrated by Wagin (1950) is close to the present specimens, but there is a long, cylindrical claw guard. The male antennule of Wagin's (1950) *D. arctica* is very similar to that of the new species. Both have a short aesthetasc, similar proportions of the articles, and no lateral seta at the base of the claw. However, Wagin draws the two subterminal setae on the claw guard close to the tip, and shows no comb-like array of teeth on the third article's spines. The third article also has an evident fusion seam.

The hosts of *D. argentinensis*, *D. fisheri*, and *D. arctica* are all members of the Asteroiidae, but this is not a strong argument for their close relation. Other asteroiids of the genera *Leptasterias*, *Coscinasterias*, *Allostichaster*, and *Diplasterias* are infested with *Dendrogaster* species exhibiting a variety of morphologies (Wagin 1976, Inaba 1963, Hickman 1959, Fisher 1940). It is tempting to recognize a species group containing *D. argentinensis*, *D. fisheri*, and perhaps *D. arctica* on the basis of a mantle with four relatively simple, equal primary branches. But it remains to be shown how and whether the mantle branching pattern in *Dendrogaster* can be used to interpret interspecific relationships.

*Host-parasite relations.*—*Dendrogaster argentinensis* seems to have a variable impact on its host. In one case the host's gonads were undeveloped, suggesting parasitic castration, but in the other hosts the gonads were as well developed as other sea-stars from the same samples. Perhaps the questionable host was at an inactive point in its reproductive cycle. The atrophy of the pyloric caeca in the same sea-star is probably due to crowding rather than feeding, because *Dendrogaster* is reported to feed on the coelomocytes that attempt to encapsulate it (Wagin 1976).

*Biogeography.*—*Dendrogaster argentinensis* expands the range of its already widespread genus to include South American shores. The lack of ascothoracids from that continent till now is certainly the result of oversight, not of absence. The find of an ascothoracid parasitic on a gorgonian at bathyal depths off Colombia (Grygier 1984), as well as the records listed in the Introduction from the South American sector of the subantarctic, indicate that South America is likely to be a rich source of Ascothoracida.

## Acknowledgments

We thank the Centro de Investigación de Biología Marina for providing the collections of sea-stars, and Dr. W. A. Newman for criticizing the manuscript. This work was partly supported by NSF Grant DEB78-15052 and is a Contribution of Scripps Institution of Oceanography, new series.

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